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*Low Luminance Visual Acuity is Better
Related to Macular OCTA Parameters
than Standard BCVA in DME*

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*Author has no conflicts of
Interest in this presentation*



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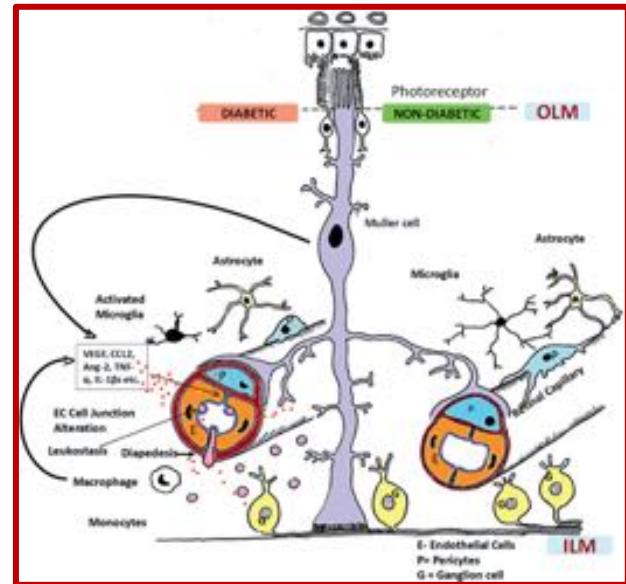


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A reliable quantitative test is essential to detect and monitor the visual function in DME eyes, mainly in early stages. ETDRS letters BCVA is often an insensitive test. This paper shows that Low Luminance Visual Acuity (using ETDRS letters) and Low Luminance Deficit are significantly more sensitive to detect visual function changes in DME, mirroring the degeneration of the components of the retinal neurovascular unit, as proven by OCTA parameters.

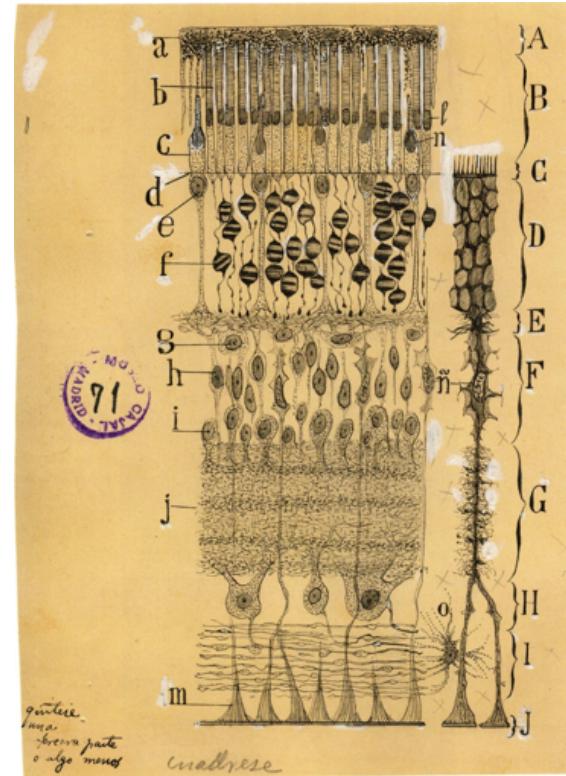
Diabetic Macular Edema

- ✓ *The major cause of legal blindness in diabetes*
- ✓ *The real impact on visual function is poorly known, mainly in early stages*
- ✓ *A disorder of the retinal neurovascular unit*



DME and Standard ETDRS BCVA: Limitations

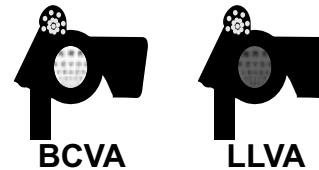
- ✓ *Poorly correlated to OCT and OCTA parameters*
- ✓ *Inadequate to detect fine visual function changes and correlate with daily life tasks*
- ✓ *Better and simple paramters ?*



Santiago Ramon y Cajal, 1887



Low Luminance Visual Acuity



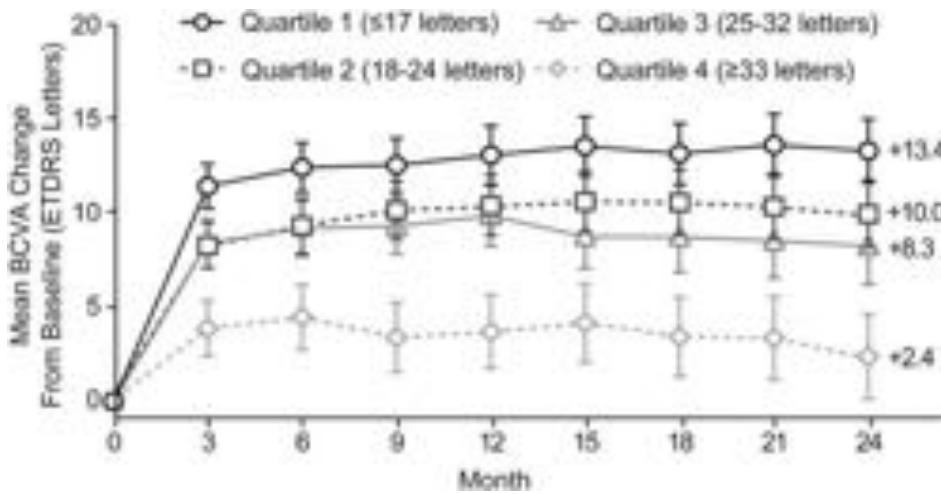
- ✓ *LLVA is measured just after standard BCVA (a few minutes)*
- ✓ *Measured using a 2.0-log unit neutral density filter placed in front of the eye*
- ✓ *Low Luminance Deficit (LLD): BCVA - LLVA*



LLVA & LLD in GA and wAMD

“LLD, a simple, inexpensive, and rapid measure of visual function was a strong predictor of the subsequent risk for losing VA in eyes with GA...

*JS Sunness et al, Ophthalmology, 2008
E Pilotto et al, Graefes Arch, 2019*



... and wet AMD too”

*RE Frenkel et al, BJO, 2016
Predicting vision gains with antiVEGF therapy in neovascular AMD patients by using LLA*



The Aim

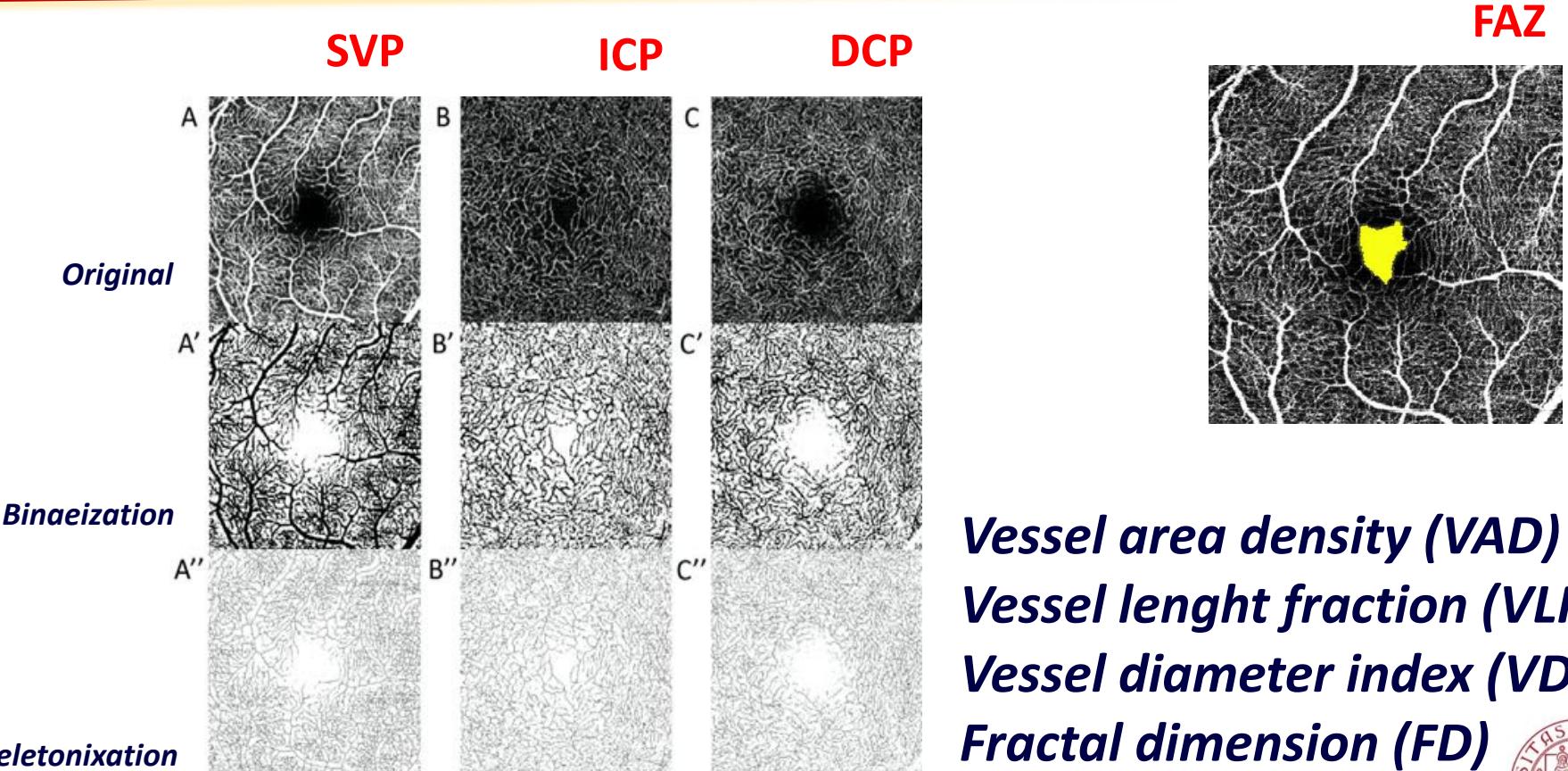
To investigate if LLVA and LLD are differently related - compared to standard BCVA – to OCT and OCTA parameters in DME



- ✓ *36 eyes (36 pts) with early, untreated center-involving DME*
- ✓ *Visual function: standard BCVA, LLVA and LLD*
- ✓ *OCT and OCTA*
- ✓ *OCTA parameters: VAD, VLF, VDI, FD and FAZ area*



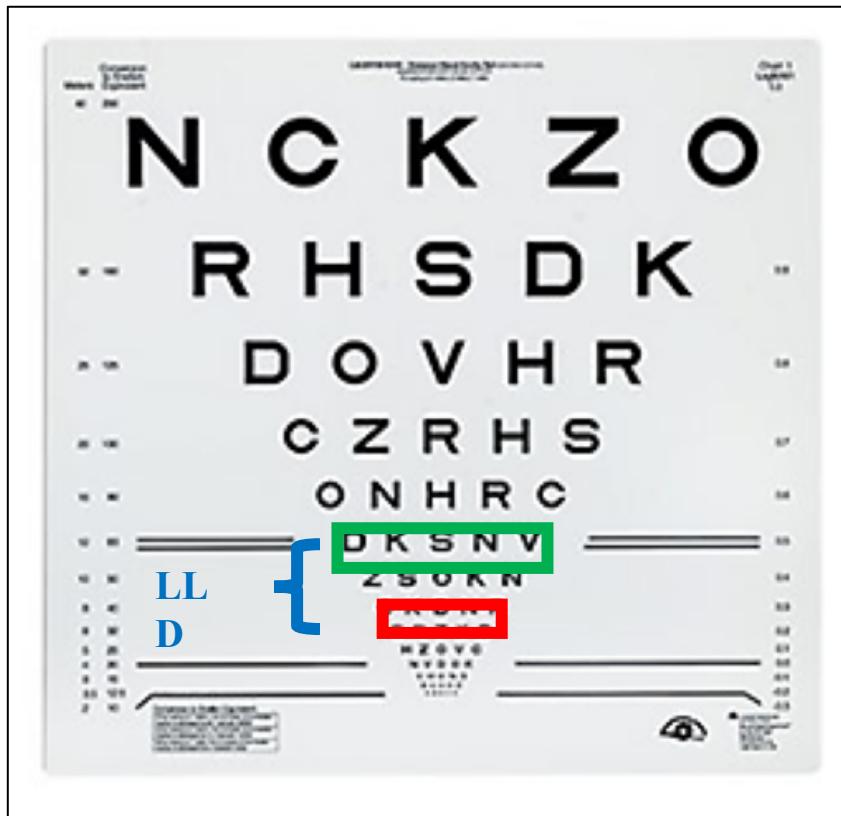
OCTA Parameters (for each plexus, except FAZ)



Vessel area density (VAD)
Vessel lenght fraction (VLF)
Vessel diameter index (VDI)
Fractal dimension (FD)



Results



	Mean	SD
BCVA	80.9	4.9
LLVA	64.7	12.0
LLD	16.2	9.3

Normal LLD: 7.9 ± 2.1



Results

- ✓ *NO correlation between:*
 - ✓ *CRT vs BCVA, LLVA and LLD*
 - ✓ *FAZ and Choroidal Thickness vs BCVA*
 - ✓ *BCVA vs OCTA parameters in SCP, ICP and DVP*



Results

LLVA and OCTA parameters

LLVA vs OCTA	RC	p-value
VAD	84.53730	<0,0001
VFL	361.72000	<0,0001
VDI	14.76090	0,0019
FDbin	50.88600	<0,0001
FDsk	54.56950	<0,0001

RC: Regression Coefficient

FAZ area vs LLVA : p<0,002

Plexus	LLVA vs OCTA	RC	p-value
SVP	VAD	28.5815	0,0115
	VFL	139.5700	0,0199
	FDbin	80.3758	0,0067
	FDsk	77.9012	0,0116
ICP	VAD	162.7700	0,0097
	VFL	589.5900	0,0066
	FDbin	57.6010	0,0071
	FDsk	65.2816	0,0059
DCP	VAD	129.9500	0,0014
	VFL	468.3700	0,0011
	VDI	31.2488	0,0024
	FDbin	59.4906	<0,0001
	FDsk	64.0544	0,0001



Results

LLD and OCTA parameters

LLD vs OCTA	RC	p-value
<i>VAD</i>	-55.54020	0,0001
<i>VFL</i>	-245.02000	<0,0001
<i>VDI</i>	-8.26170	0,0130
<i>FDbin</i>	-33.30140	<0,0001
<i>FDsk</i>	-36.22720	<0,0001

RC: Regression Coefficient

FAZ area vs LLD : p<0.0002

Plexus	LLD vs OCTA	RC	p-value
SVP	<i>VAD</i>	-58,2868	0,0175
	<i>VFL</i>	-290,3700	0,0142
	<i>FDbin</i>	-57,9813	0,0093
	<i>FDsk</i>	-61,1315	0,0089
ICP	<i>VAD</i>	-111,1700	0,0179
	<i>VFL</i>	-401,7400	0,0131
	<i>FDbin</i>	-37,0167	0,0193
	<i>FDsk</i>	-42,4410	0,0158
DCP	<i>VAD</i>	-94,9415	0,0031
	<i>VFL</i>	-351,8000	0,0018
	<i>VDI</i>	-20,0953	0,0111
	<i>FDbin</i>	-44,9650	0,0002
	<i>FDsk</i>	-49,0618	0,0002



Discussion

- ✓ *BCVA is unable to identify subtle visual function changes and to offer real prognostic information in DME*
- ✓ *In DME: LLVA and LLD may functionally mirror the degeneration of the neurovascular unit as shown by OCTA detailed parameters*



Discussion

- ✓ Müller cells are known to influence LLVA and LLD*
- ✓ The known damage of Müller cells in diabetes may be the link between LLA/LLD changes, undetectable to BCVA, and (early) DME**, ***

* E Pilotto et al, Graefes Arch, 2019

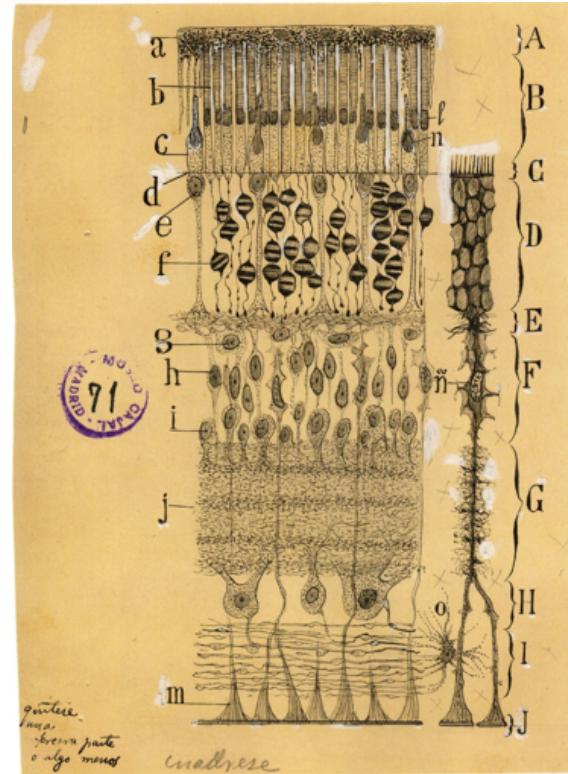
*E Midena et al, Retina, 2019

***S Vujosevic et al, IOVS, 2015



The DME Visual Function Unmet Need

- ✓ BCVA is NOT enough in pts with DME, mainly in early stages
- ✓ LLVA and LLD better correlate with macular flow OCTA parameters mirroring neurovascular unit degeneration



Santiago Ramon y Cajal, 1887

